PANEL 2

Economic Development
This panel will provide information on the life sciences industry with a regional perspective on the redevelopment of communities, the creation of jobs, the impact on housing and transportation and the unique challenges and opportunities facing businesses in the region.

Panelists
Matthew Gardner, President, BayBIO

Robert Sakai, Technology and Trade Director, East Bay Economic Development Alliance

Dr. Wendie Johnston, Southern California Biomedical Council

Luis Vasquez, LaunchPad Director, OCTANe

Jimmy Jackson, Vice President of Public Policy & Communications, BIOCOM San Diego

Biographies

Panel 2

Matthew M. Gardner
Matthew M. Gardner is President of BayBio, the voice of the life science industry in Northern California, headquartered in South San Francisco. In total, BayBio serves the community of 900+ life science companies in Northern California, their 90,000 employees, and the supporting communities of suppliers, service firms and other stakeholders. Mr. Gardner oversees BayBio's activities in advocacy, industry advancement, membership benefits and communications. On behalf of industry, Mr. Gardner represents BayBio in industry bodies and roundtables including the Biotechnology Industry Organization, the Council of State Bioscience Associations, the Global Bioscience Partnership, and other coalitions and business development groups.

Mr. Gardner previously held the position of Director of the Maryland Bioscience Alliance, in Rockville, Maryland. There, he was responsible for serving the Mid-Atlantic bioscience community. Mr. Gardner founded new programs for the Alliance's membership, including its Clinical Development Initiative and Venture Capital Task Force. During his tenure, he served as the regional liaison for the BIO 2003 Annual Convention. Mr. Gardner is active in the community through directorships and advisory roles for organizations including the Alameda County Workforce Investment Board, UC Davis External Research Advisory Board, the Corporate Relations Advisory Group of JHPIEGO at Johns Hopkins University, the University of Maryland Industrial Partnerships Program, and the Friends of Griffith University Foundation. He earned his Bachelor of Arts in Political Science and his Master of Arts in History, both from the University of San Diego.

Robert Sakai
As Technology and Trade Director for the East Bay Economic Development Alliance, Robert Sakai’s role has been to leverage the significant technology and trade assets in the East Bay (Alameda and Contra Costa counties) for economic development purposes. His past projects have included setting up a technology development incubator; creating the Bay Area Regional Technology Alliance; successfully securing grant funding for a manufacturing extension center; and organizing trade missions to technology regions in Asia. He assists cities in developing their strategic plans, particularly as it relates to technology based economic development, and recently helped Berkeley Lab and UC Berkeley bring BP’s Energy Biosciences Institute and the Department of Energy’s Joint Bio-Energy Institute to the East Bay.

Mr. Sakai received his AB degree in history from Harvard College, received an MA in Sociology from the University of Hawaii, Manoa, and his MCP degree with emphasis on economic development, from the University of California, Berkeley.
The East Bay Economic Development Alliance (East Bay EDA) is a public/private partnership serving the San Francisco East Bay (Alameda and Contra Costa Counties) whose mission is to establish the East Bay as a world-recognized location to grow businesses, attract capital and create quality jobs.

The organization was founded in 1990 by Alameda County, its 14 cities and special districts, as the Economic Development Advisory Board. The organization's name was changed in 1996 to the Economic Development Alliance for Business (EDAB) as Contra Costa County Cities and County asked to join the organization and in June 2006, the name was changed to the East Bay Economic Development Alliance, to better reflect the bi-county mission of the organization.

Wendie Johnston, Ph. D.
Dr. Johnston is the Director of the Los Angeles/Orange County Biotechnology Center, an Applied Biotechnology Center funded by the Economic Workforce Development sector of the Community College Chancellor's Office. The Center is hosted by Pasadena City College. She has been a faculty member in the Pasadena City College Natural Sciences Division for thirty nine years. She was the founding faculty member for the Biotechnology Program at Pasadena City College in 1998, and became the Director of the Los Angeles/Orange County Regional Biotechnology Center in 1999. She has developed, through the Biotechnology Program, valuable new linkages for her students between Pasadena City College and Caltech, the California State University System, the Huntington Memorial Research Institute, the Pasadena Bioscience Collaborative, and with biotechnology industry leaders such as Amgen, Biogen, Idec, and Genentech. Dr. Johnston has received the San Gabriel Valley Economic Partnership Award for Technology Leadership and was the recipient of the YWCA Outstanding Woman in Education Award.

The Southern California Biomedical Council (SCBC) promotes and supports biomedical and biotechnology research, development, and manufacturing in the Greater Los Angeles region for economic development and job creation.

Luis Vasquez
Mr. Vasquez is currently OCTANe's LaunchPad Director. Luis joined OCTANe in 2004 as one of the first team members. Since then he has been responsible for identifying, evaluating, and helping early stage entrepreneurs and start-up companies take advantage of the OCTANe's resources and network. In this time, Luis has worked with over 100 companies and developed a network of over 200 people who are eager to provide assistance, consulting, capital, expertise, and other resources to help OCTANe LaunchPad companies achieve success. Prior to joining LaunchPad, Luis founded a start-up nanotechnology sensor company to commercialize technology developed at Caltech. He also has extensive experience in defense, industrial, and energy markets. Luis has an MBA from UC Irvine and a BS from UC Riverside.

OCTANe is Orange County's "one-stop" for innovation and entrepreneurship. By connecting people, capital and technology, OCTANe accelerates entrepreneurs and company development for Orange County's biomedical and information technology community. OCTANe's mission is to create, grow, support, staff and fund more innovative Biomedical and IT companies in Orange County.

Jimmy Jackson
Mr. Jackson is the Vice President of Public Policy and Communications for BIOCOM. He has served as Chief of Staff for retired Senator Dede Alpert. Mr. Jackson was responsible for several laws, including SB 1360 of 1997 (rights of families of murder victims), SB 148 of 1998 (insurance coverage for medical foods and formulas used in treatment of PKU), and SB 1855 of 2004 (disclosures for homeowners insurance policies). He has been a guest lecturer for graduate courses at the University of California, San Diego, and has spoken extensively on government and advocacy in other settings.

BIOCOM is a premier life science industry association representing more than 550 member companies in Southern California. The association focuses on initiatives that positively influence the growth of the life science industry, including capital formation, public policy, workforce development, and scientific discovery and development.

INNOVATION, SMART GROWTH AND THE LIFE SCIENCES INDUSTRY

ASSEMBY AND SENATE BIOTECH SELECT COMMITTEES

OCTOBER 29, 2007

1

ABOUT BAYBIO

1. BayBio is an industry organization, founded in 1990, that serves and supports the Northern California bioscience industry. BayBio is committed to advancing the bioscience industry through enterprise development, advocacy, group purchasing, education and communications.
2. BayBio reflects its membership: 375 organizations engaged in or supportive of the development of advanced life science products.
3. Affiliated with the Biotechnology Industry Organization (BIO), Advamed, in coalitions with NVCA, others

2

REGIONAL PROFILE

- Region: 125 Cities / 12 Counties
- Approximately 900 Companies
- Direct Jobs: 90,000+
- Total Jobs: 250,000
- Wages Paid: US $5.8 Billion
- Average Wage: US $68,000

- Company Size:
  62% Small: 1-50 employees
  33% Medium: 50-450 employees
  5% Large: >450 employees

- All Biotech Applications: Agricultural Biotechnologies through Biopharmaceuticals to Devices & Lab Instruments

WHERE IS THE INDUSTRY?

INDUSTRY ENTRY LEVEL WAGES.....

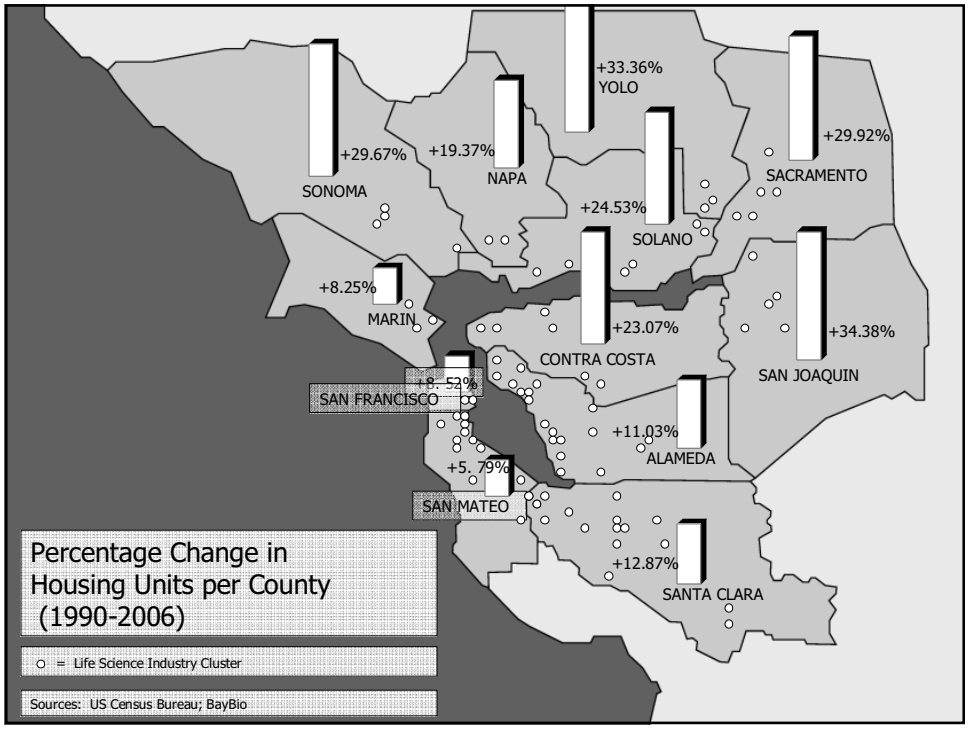
Job Description	Education Level Required	Salary Range
Laboratory Support Worker	High School Diploma	$17,000-$27,000
Laboratory Assistant	Some College	$21,000-$30,000
Manufacturing Assistant	Some College	$24,000-$30,000
Laboratry Technician	College Required	$25,000-$45,000
Research Associate	Bachelors/Masters	$30,000-$70,000

Source: California Careers in Biotechnology 2nd Edition 2002.

DO NOT MATCH HOUSING PRICES

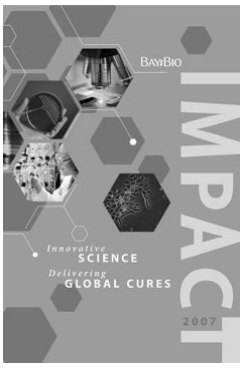
County	2006 Median Home Price
Alameda	$595,000
Contra Costa	$575,000
Marin	$815,000
Napa	$600,000
Sacramento County	$366,000
San Francisco	$762,000
San Joaquin	$430,000
San Mateo	$755,000
Santa Clara	$680,000
Solano	$455,000
Sonoma	$545,000
Yolo County	$425,000

Source: DataQuick



WE WILL CONTINUE INVESTING IN CALIFORNIA

- 393 approved products; 400 in phase II and phase III
- 514 distinct therapies in many disease applications
- Priorities in cancer, infectious disease, and conditions affecting aging populations



BAYBIOIMPACT 2007

Indication	Approved Products	Ph II and III
Infectious Disease	79	35
Cancer	32	169
Dermatology	25	14
CNS	24	51
Respiratory, Pulmonary	19	28
Cardiovascular	16	27

SIGNIFICANCE OF THE DATA

- Pending $100 billion++
- Bottlenecks: discovery, commercialization, manufacturing, human
- Success breeds success
- Product era arrival

SUSTAINING LONG-TERM GROWTH

"The Bay Area has over 100 bioscience firms… employing more than 19,000 people."

– Launch newsletter, BayBio, July 1989

"Thirty-four of the forty-two jobs in highest demand are in clinical and regulatory affairs."

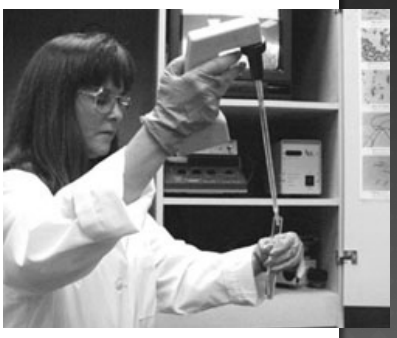
- Biocom/San Diego, February 2000

"The largest numerical increase in employees is expected in the research associates position… The next largest increase in hiring appears to be in the manufacturing associates… Large companies appear to be only hiring for the research associates and clinical lab associates positions."

- *Future of the Industry*, BayBio Institute-SJSU Needs Assessment, May 2006

WHAT TYPES OF JOBS?

- Lab technicians
- Clinical lab technicians (certifications)
- Regulatory affairs specialists (certifications)
- Biostatisticians and bioinformatics specialists
- Manufacturing technicians
- General employment profile: administration



Historically strong in lab technician employment, Northern California is also now growing in clinical, regulatory and manufacturing professions. Photo courtesy of Bio-Link.

WILL THE STATE INVEST IN EDUCATION AND TRAINING?

"I just want the governator out there to know that we are hot on his trail"

- North Carolina Governor Mike Easley at the 9/19/07 opening of the $68 million biomanufacturing training center at North Carolina State University

ARE WE PREPARED?

- Previous efforts
- Ohlone
- Building on seeded programs
- CSUEB (and/or Solano)

New BRITE Facility in North Carolina: Over $20 million

CASE STUDY:

NCBC BRITE+NCSU

- $80 million+
- Pilot scale sites
- Established training
- Golden Leaf

NC Gov. Mike Easley at the NCSU Opening 9/19/07

ARE WE PREPARED?

- 10% headcount growth per annum
- Science Education: F
- 50% talent import
- 5-10 year window
- Emerging growth
- New technologies
  - Personalized medicine
  - Nano-scale tools
  - Energy

CASE STUDY:
CARB II, UMBI

- $60 Million
- Pilot scale
- Broke ground '03

CARB II at the University of Maryland Biotechnology Institute

Thank you!

For further information:

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Joint Hearing of the Assembly and Senate Select Committees on Biotechnology

The Impact of Biotechnology on the East Bay

Ohlone College
Jackson Theater
October 29, 2007

The East Bay is a Mature Biotech Cluster

- Research and development
- Entrepreneurs
- Knowledgeable capital
- Workforce
- Networked business and research infrastructure
- Manufacturing

East Bay Biotech Infrastructure:
Research Institutions

- UC Berkeley
- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- Sandia National Laboratories California
- Children's Hospital Oakland Research Institute

East Bay Biotech Infrastructure:
Other Life Science Research Institutes

- Joint Genome Institute
- Molecular Foundry
- QB3
- Advanced Light Source
- National Energy Research Scientific Computing Center
- Bio-Nano Technology Center

East Bay Biotech Infrastructure:
Other Life Science Research Institutes (continued)

- Kaiser Permanente Department of Research
- California Dept of Health Services, Richmond Laboratory
- Department of Toxic Substances Control
- And Others…

Biotech Impacts on the East Bay

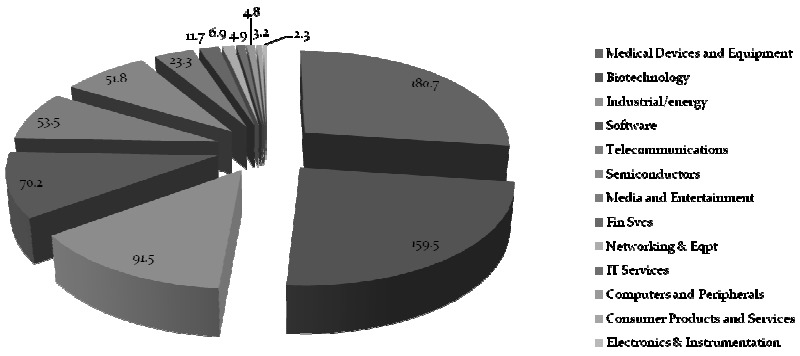
Then (2002):

- 164 companies in the “Biotech Crescent”

Now (2007):

- 1/3 left
- 2X as many companies
- Losses: Chiron, Therasense, Abgenix, Berlex
- Gains: Novartis, Abbott Laboratories, Amgen, Novo Nordisk

VCs invested $340 M in East Bay Life Science Companies in Q1,2 2007



Selected Life Science Fiscal Contributions to the East Bay Economy, First Half 2007

Venture Capital	**$340 M**
EBI, JBEI	**$920 M**
TOTAL	**$1.26 B**

Examples of East Bay Life Science Manufacturing

Abbott Diabetes Care
Amgen
Bayer
Boston Scientific/Target
Novo Nordisk
Xoma

East Bay Examples of Exemplary Workforce Training

- Ohlone
- Biotech Partners
- Workforce Investment Board

Where Do We Go from Here? Part 1

- Helios
- Energy Biosciences Institute
- Joint Bio-Energy Institute
- Synthetic biology

Where Do We Go from Here? Part 2

- Can we retain biotech manufacturing? Biofuels?
- Will housing costs stifle recruitment?
- Is it getting too expensive for small companies to compete?
- Can current biotech industry leaders be replaced?
- Can institutional barriers and geographic distance be overcome?
- Industry issues: Offshoring? Biogenerics? Healthcare policy?

Resources to Get There

- The East Bay has substantial growth resources
- The East Bay has attained cluster critical mass – manufacturing
- We enjoy a strategic location for leveraging the Bay Area's potential for technology fusion

Joint Hearing of the Assembly and Senate Select Committees on Biotechnology

The Impact of Biotechnology on the East Bay

Robert Sakai

Technology and Trade Director

East Bay Economic Development Alliance

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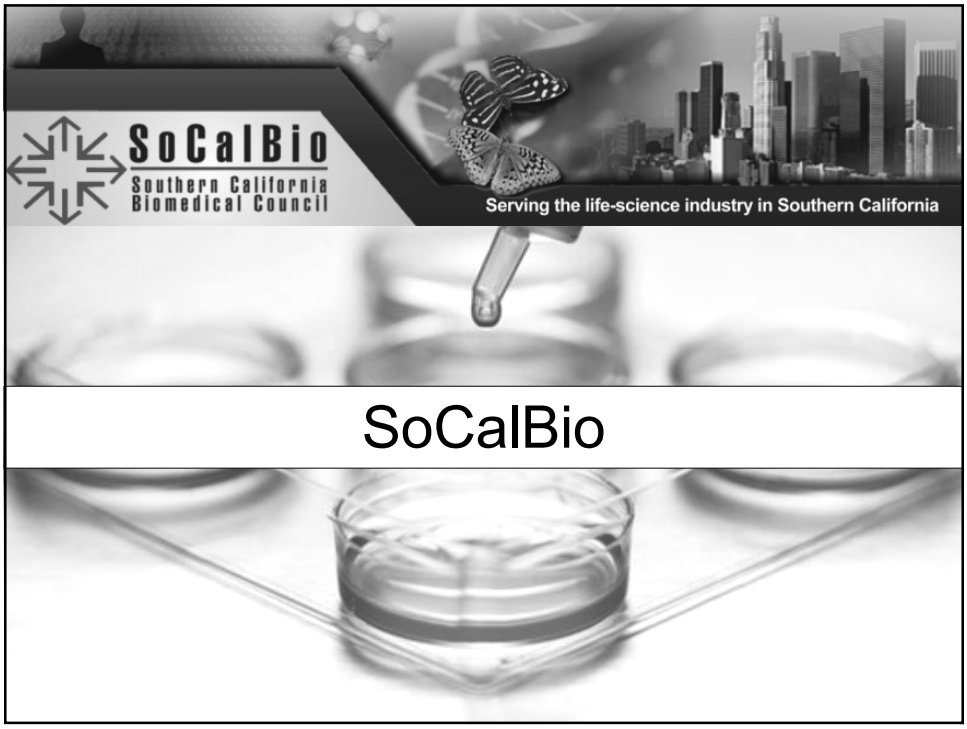


SoCalBio

- Southern California Biomedical Council (SoCalBio) is a life-science trade association with service from Santa Barbara to Los Angeles/Orange County and the Inland Empire.

October 29, 2007

Profile of the Life-Science Industry in the Los Angeles/Orange County Region

Sector	2004 employment	2004 establishments	Industry specialization (Location quotient)
Medical Devices	28,304	865	1.61
Research, Testing & Labs	24,886	1,004	1.40
Drugs & Pharma	12,058	164	0.95
Agbiotech & Chemicals	910	46	0.19

- **66,158 life-science jobs**
- **2,079 establishments**

Source: Growing the Nation's Bioscience Sector: State Bioscience Initiatives 2006, Battelle Technology Partnership, 2006

Job Creation - Workforce Development

- Community College efforts
  - Certificate Programs with internships
- University efforts
  - CSU - CSUPERB, C-LAB
  - KGI, USC, UCLA, UCI
- SoCalBio, OCTANe - "The Glue"
- High School collaboratives
  - SB-70
  - Industry
  - Education

Impact on housing and transportation

- Direct: Employment and payroll
- Multiplication of Direct
  - Indirect impacts: purchases to support production
  - Induced impacts: employee spending for consumer goods
- Impact of high wage jobs on values
  - Sustainability - “green” ethics at work and home
  - Work to home proximity
  - Public transportation efficiency
  - Education / re-training access

These values fuel community redevelopment efforts

Redevelopment of communities

- Renewed momentum for development of research parks with industry clustering
  - Incubation of new technologies
  - Collaboration will optimize:
    - Intellectual capital,
    - Financial strategies,
    - Workforce development.

Examples -

- AccelTech Incubator, Cal Poly Pomona
- Pasadena Bioscience Collaborative

Ground-breaking

- ATEP Advanced Technology/Education Park, Tustin
- USC Biomedical Research Park
- Transit Village, El Monte

Unique challenges and opportunities facing bioscience industry

- Creation of Jobs - Workforce Development
  - Improved access to WIA support for training
  - Salary equity between industry and education
  - Incentives to colleges for workplace training or internships for reality checks
  - Incentives for faculty internships / industry teaching
- Impact of industry on housing/transportation
  - Affordable housing and efficient transportation are needed for those in support jobs
- Redevelopment of communities
  - State and local government support for research parks and incubation/training centers

October 29, 2007

Joint Hearing of the Assembly and Senate Select Committees on Biotechnology

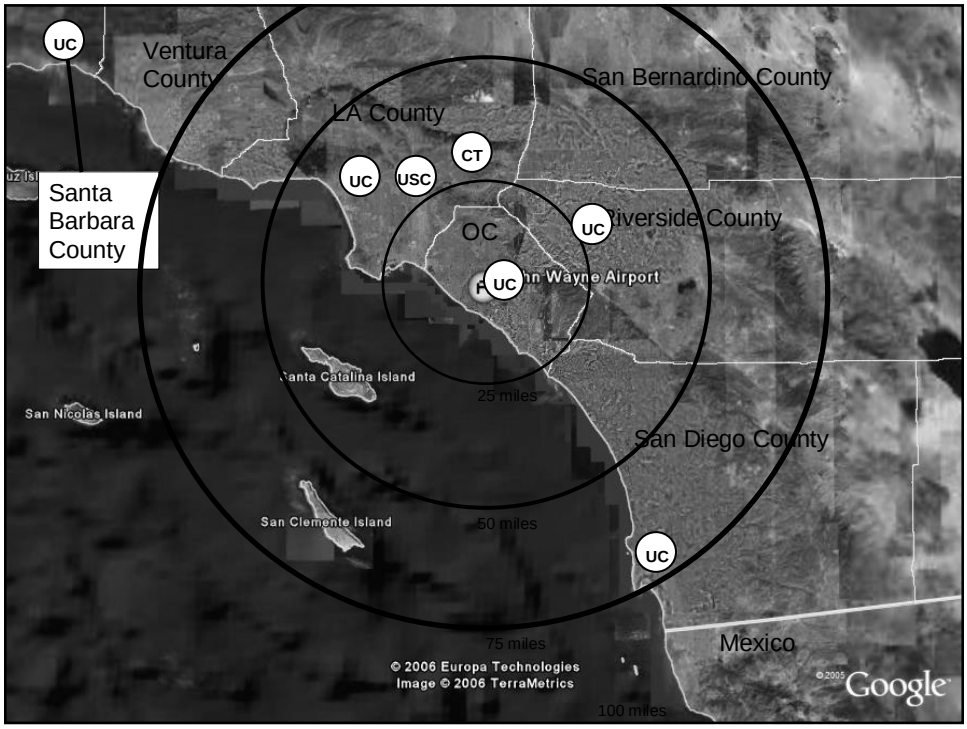
Luis Vasquez – OCTANe

October 29, 2007

Orange County Biomedical Snapshot

- County population: 3,100,000
- Biomedical/lifescience workers: 35,000
- 350+ Medical device companies

•UC Irvine: $263 million in external funding from federal and state agencies, and the private sector. Large portion to fund biological science research
  - Beckman Laser Institute: clinical medicine use of lasers
  - UC Irvine Eye Institute
  - LifeChips: Combine life science and technology at micro and nano-scales.



Ophthalmology Companies

Major Companies

- **Allergan Inc.**
  - Ophthalmological and skin care products
  - Market Cap $19B
  - 2,500 OC Employees
- **ISTA Pharmaceuticals Inc.**
  - Ophthalmological drugs
  - Market Cap $179M
  - 73 OC Employees
- **Advanced Medical Optics In.**
  - Maker of ophthalmological surgical devices and eye care products
  - Market Cap. $2.5B
  - 424 OC Employees
- **Cooper Companies**
  - Maker of contact lenses and surgical products
  - Market Cap. $2.4B
  - 180 OC Employees
- **Alcon, Inc.**
  - Maker of ophthalmological drugs, surgical products and instruments
  - Market Cap $40B
  - 605 OC Employees
- **Spectrum Pharmaceuticals**
  - Maker of cancer and generic drugs
  - 30 OC Employees

Venture Backed

- **ReVision Optics**
  - Refractive surgical solutions
  - $40M Funding
- **AcuFocus**
  - Maker of surgical implants
  - $57M Funding
- **Eyeonics**
  - Intraocular lens maker
  - $43M Funding
- **Glaukos**
  - Glaucoma treatments
  - $53M Funding
- **Refractec**
  - Non-laser surgical solutions
  - $36M Funding
- **Visiogen**
  - Intraocular lens maker
  - $63M Funding
- **IntraLase Corp.** (Acq. by AMO)
  - Designs and develops laser tech
  - $73M Funding
- Others

Cardiovascular Companies

Major Companies

- **Edwards Lifesciences Corp.**
  - Maker of heart valves, stents, catheters, surgical clips and implantable grafts
  - Market Cap $2.8B
  - 1,650 OC Employees
- **Medtronic, Structural Heart Disease Business**
  - Heart valve replacement and repair devices
  - Market Cap $59B
  - 563 OC Employees
- **Eli Lily and Co.**
  - Cardiovascular drug maker
  - Market Cap $67B
  - 290 OC Employees
- **eV3, Inc.**
  - Maker of endovascular devices
  - Market Cap $1B

Venture Backed

- Endologix, Inc.
  - $7M Funding
- CoreValve
  - $62M Funding
- TherOx, Inc.
  - $87M Funding
- 3F Pharmaceuticals
  - $34M Funding
- Arbor Surgical Technologies, Inc.
  - $31M Funding
- Cameron Health, Inc.
  - $81M Funding
- Orqis Medical Corp.
  - $72M Funding
- MiCardia Corporation
  - $9M Funding
- VenPro Corporation
  - $7M Funding
- MicroVention, Inc.
  - $52M Funding
- VenPro Corporation
  - $7M Funding
- MicroVention, Inc.
  - $52M Funding
  - Bought by Japanese firm
- TheraCardia, Inc.
  - $30M Funding
- Vascular Control Systems
  - $23M Funding
  - Bought by J&J

Orange County Life Sciences

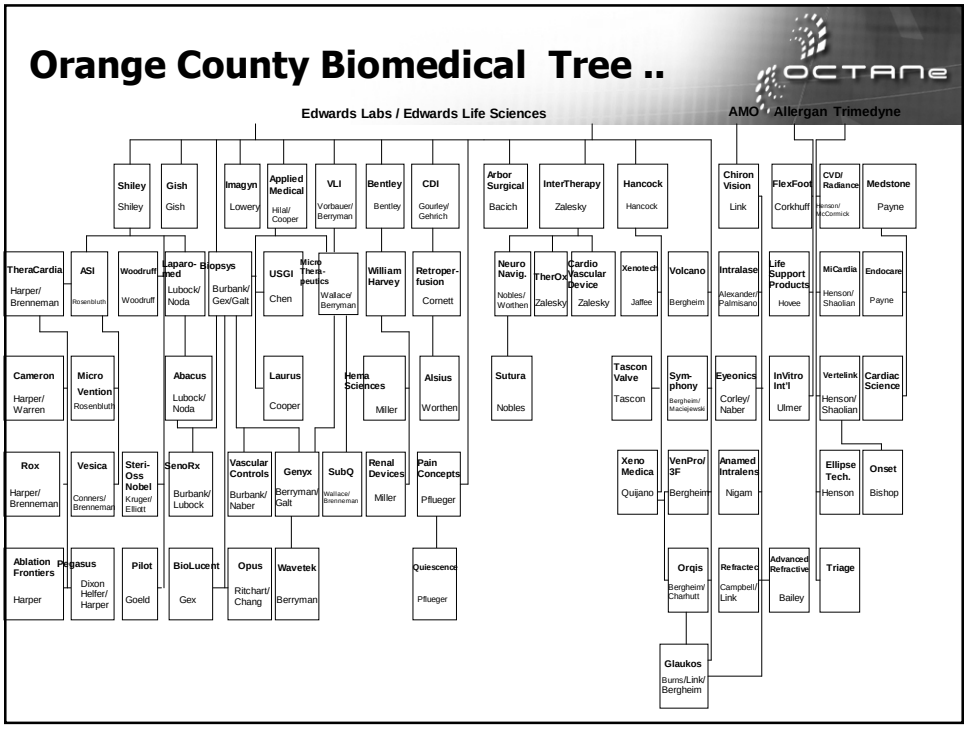
Other Life Science Companies

- **Beckman Coulter**
  - Market Cap $4B
  - 2,554 OC Employees
- **Peregrine Pharmaceuticals**
  - Market Cap $190M
  - 88 OC Employees
- **Advanced Sterilization Products**
  - Johnson & Johnson Company
  - 271 OC Employees
- **B. Braun Medical Inc.**
  - Intravenous solutions
  - 1,281 OC Employees
- **Avail Medical Products**
  - Maker of medical devices
  - 400 OC Employees
- **Viasys Respiratory**
  - Maker of ventilators
  - 275 OC Employees
- **Sybron Dental Specialties**
  - Infection prevention products
  - 388 OC Employees
  - Getting acquired
- **Nobel Biocare**
  - Dental implants
  - 271 OC Employees
- **Teva Pharmaceuticals**
  - 750 OC Employees
- **Valeant Pharmaceuticals**
  - 419 OC Employees
- **Codan US Corp**
  - 160 OC Employees
- **Sechrist Industries**
  - Respiratory equipment
  - 130 OC Employees
- **SenoRx Inc.**
  - Breast cancer treatment
  - 128 OC Employees
- **Gish Biomedical**
  - Synthetic blood vessels
  - 110 OC Employees
- **Irvine Scientific Sales Co.**
  - Maker of culture supplies
  - 97 OC Employees
- **Hycor Biomedical Inc.**
  - Maker of diagnostic products
  - 93 OC Employees

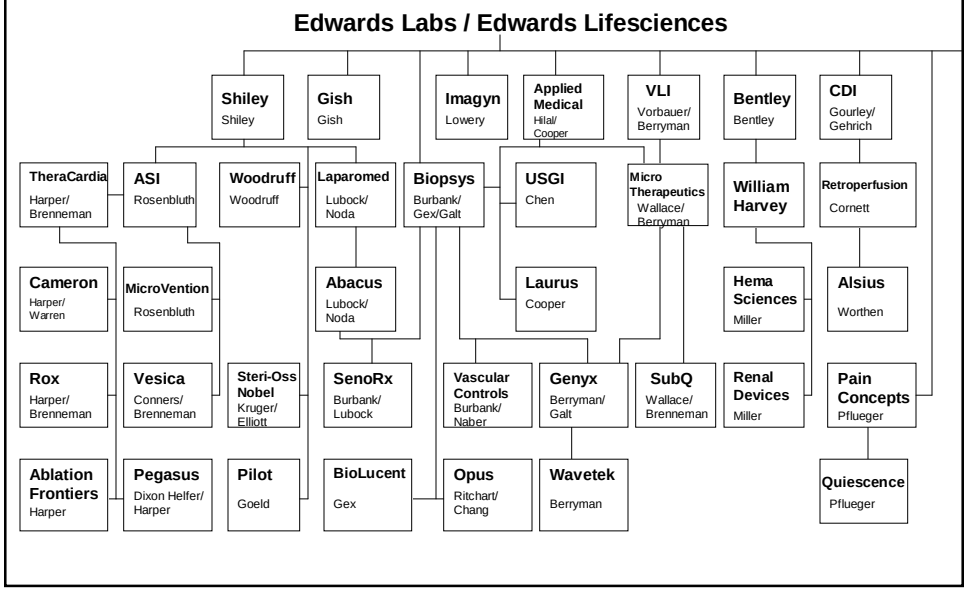
Other Venture Backed Companies

- **Alsius Corporation**
- **Massimo Corporation**
- **Novocell, Inc.**
- **Devax, Inc.**
- **Kadmus Pharmaceuticals**
- **USGI Medical, Inc.**
- **Pegasus Biologics, Inc.**
- **Chimeric Therapies, Inc.**
- **Opus Medical, Inc.**
- **Vascular Control Systems**
- **Neocrin Company**
- **Hudson Respiratory Care**
- **Symphony Medical**
- **TransDx**
- **Hearten Medical, Inc.**
- **Triage Medical, Inc.**
- **Emergent Respiratory Products, Inc.**
- **Windy Hill Medical, Inc.**
- **GluMetrics, Inc.**
- **Ad PathLabs**
- **Reprogen, Inc.**
- **Onset Medical Corporation**
- **BioLucent, Inc.**
- **CODA Genomics, Inc.**
- **Aeolus Pharmaceuticals, Inc.**
- **Numira Biosciences, Inc.**
- **Endocare, Inc.**

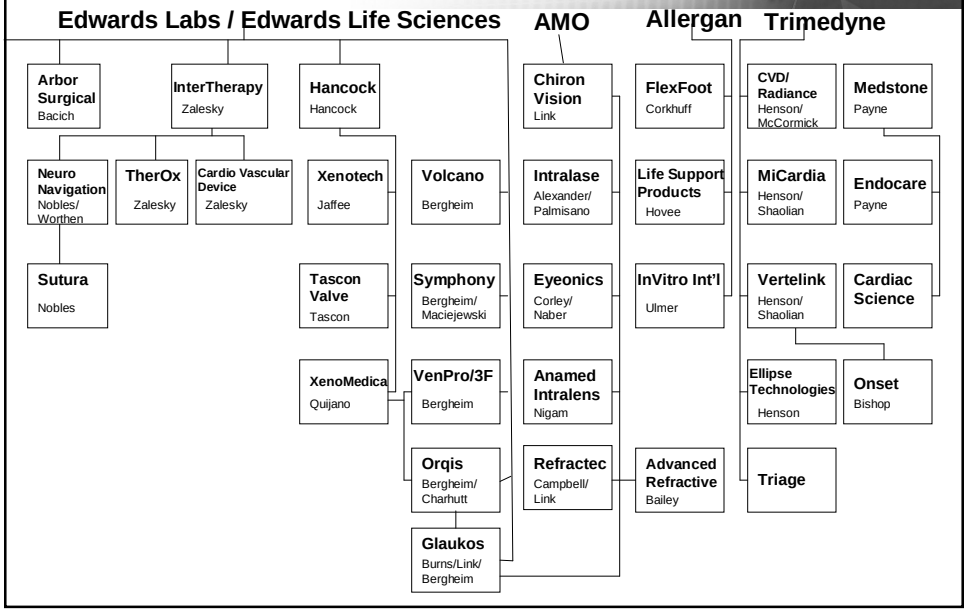
Orange County Biomedical Tree ..



Orange County Biomedical Tree ...



Orange County Biomedical Tree ..



OCTANe TalentEngine

New development – April 2007

- 124 total companies signed up
  - o 56 Biomedical comp.
- 415 jobs posted to date
  - o 217 Biomedical jobs
- Close to 150 people have applied for a job through the TalentEngine

Some Recent Success Stories…

Edwards

BOXADOR

New look of TalentEngine

Conclusions

- **Orange County has a thriving biomedical industry**
- **OCTANe supports the industry at all levels**
- **Local impact of biomedical industry**
  - High salaries
  - Rewarding careers
  - Companies and corporations that “make a difference”
  - Innovation and entrepreneurial culture
  - Jobs and opportunities for the thousands of university graduates with biological/chemical/biomedical engineering degrees
- **Worldwide impact**
  - Improving the health and the lives of patients through out the world.

Testimony of

Jimmy Jackson, Vice President of Public Policy and Communications, BIOCOM

Joint Hearing of the Assembly and Senate Select Committees on Biotechnology

October 29, 2007

Relevant websites:

www.biocom.org

www.biocomworkforce.org

Good Morning, my name is Jimmy Jackson, Vice President of Public Policy and Communications for BIOCOM. BIOCOM is a life science trade association for the San Diego and Orange County area, and with 570 dues paying members we are the largest regional life science association in the country. The vast majority of our industry members are smaller companies, with less than 100 employees and most having less than 50. It is truly a microcosm of the profile of the life science industry itself.

BIOCOM's membership includes biotechnology and medical device companies, universities, and basic research institutions, and service support firms. As an advocacy organization we are actively engaged in ensuring that the life science industry remains a strong and growing part of the state's economy.

As Orange County is also represented by Mr. Augusta, I will restrict my comments to the San Diego region. The San Diego life science cluster is one of the most respected in the

nation. By most metrics, it is one of the top two life science research hubs in the nation. San Diego boasts four major research institutions: the University of CA San Diego, the Salk Institute, the Scripps Research Institute, and the Burnham Institute, and many smaller but equally vital ones. But the industry's impact goes far beyond our renowned research institutions.

The San Diego life science cluster is a web of multinational companies with local presence, large and mid-sized San Diego-based companies, and start-ups The San Diego Association of Governments estimates the industry's direct and indirect economic impact on the San Diego economy at a staggering $8.5 billion dollars. Not only that, but in 2006 San Diego life science companies attracted $901 million in venture capital, exceeding that of the New England life science cluster. And according to Rich's CA Business Directories, the San Diego County life science cluster directly employs over 35,000 employees, with an average wage of over $65,000.

In the early 1990's, San Diego was a city dependent on the military and federal government contracting. Then, in short order, the federal Base Closure and Realignment Commission closed the San Diego Naval Training Center and General Dynamics, which had employed over 10,000 at one time, closed or sold its San Diego operations, resulting in a stunning blow to the economy. San Diego was reeling. But city leaders also recognized the possibilities presented by having existing cornerstones like the Salk Institute (which sits on land donated by the City of San Diego), which could lead to opportunities to build an industry. They set aside large swaths of land in close proximity

to the research institutes for commercial development with what they called "base sector industries", high growth, high wage industries. And as a result of this foresight, the Torrey Mesa and Sorrento Mesa areas of San Diego are national leaders in the life science and high technology sectors. The life science industry was a major catalyst in the transformation of San Diego's economy away from the defense sector orientation of the past, and brought with it opportunities only dreamed of a short decade ago.

This geographic concentration of high-skill workers and tremendous research capabilities had a some what unexpected outcome—a unique sense of collaborative spirit among life science companies. Former employees of just one pioneering former San Diego company, Hybritech, have gone on to found or become senior management team members of over 50 life science companies at last count. Today, successful veteran executives of the industry participate in BIOCOM programs to mentor new and up and coming executives.

BIOCOM and its member companies are also active in nurturing our next generation of life science industry workers. Under a grant from the U.S. Department of Labor, BIOCOM and the San Diego Workforce Partnership developed the Life Sciences Summer Institute, which takes upper level high school, community college and university students, as well as high school teachers, and introduces them to the leading companies and institutions in the San Diego life science community. Included in your binders is an article on LSSI that will come out this week.

Participants are put through a one week “biotech boot camp”, teaching them basic lab skills and safety principles. Then they are put in working labs, side by side with working scientists. Many of these students have ended up working part of full time in the companies at which they interned.

Just as importantly, the LSSI reaches out to teachers. It is estimated that with each teacher, we potentially reach 169 students per school year. By including teachers, one fully optimizes the outreach potential for this program. In fact, in the article in your binders you will learn about Malinda Dixon, a teacher in the Poway Unified School District, one of the most honored and respected districts in the state. Malinda participated in the first year of LSSI in 2005, and was so energized by her summer externship, she went on to develop a full year biotechnology class, which was recently adopted by her district. This one teacher will be responsible for exposing thousands of students to biotechnology both as a science and a career path.

As another component of the U.S. Labor Department grant, BIOCOM developed the BIOCOM Career Center website, which can be found at www.biocomworkforce.org. On this site, the user can access basic information on biotechnology and the life sciences, search for open jobs, do a career pathway search, or look for education and training programs. In the job search category, a person interested in a career in the industry can search careers by industry category, or even by education level. For instance, if someone searching for potential opportunities in the industry clicks on “high school diploma” for education level, 63 job categories with a minimum high school diploma requirement are

found. This website gives students real life examples of the types of jobs available to them within the industry.

We have asked to comment on the industry's local impact on housing and transportation. Jobs in the life science industry are largely high wage jobs, so the impact on the housing market is on the middle and upper-middle portions of the market. As you probably are aware, San Diego is a high cost housing market; but competitiveness issues dictate that the wages and opportunities provided by the industry are such that

Transportation impacts of the industry are difficult to assess. The two major hubs of the San Diego cluster, the Torrey Pines/Sorrento Mesa region and the north coastal cities of Carlsbad and Oceanside, both are undergoing explosive residential growth as well as steady industrial growth in other industry sectors, such as high technology and electronics. So while additional vehicle trips are generated, the additional sales and property taxes generated by our companies and their employees creates a significant benefit for the transportation infrastructure in which they are housed.

The life science industry in CA faces many challenges. High housing costs, high cost of doing business, and excessive and duplicative state regulation are but a few. But perhaps the biggest challenge to the state's industry is the attractiveness of the industry itself. Many states such as Arizona, Florida, Ohio and North Carolina have aggressive programs to recruit our companies to their states. They offer land and financial incentives, educated workforces with training credits, and extensive state support mechanisms.

California cannot continue to assume it will capture a significant segment of the industry because we are California, or even because we are the birthplace of the life science industry. We must develop a comprehensive plan that will allow California to retain and expand its segment of the industry. These challenges are not unique to San Diego, but face California as a whole.

San Diego's available industrial land is dwindling, and that which is there continues to escalate in price. But there is available land elsewhere in California. With proper incentives, perhaps California companies could be enticed to economically challenged areas adjacent to our life science hubs, areas such as the Imperial Valley in the south and the Central Valley to the north.

Exciting discoveries are occurring in California research labs every day. The research and products that will be funded by the California Institute for Regenerative Medicine will position CA in a leadership role in the stem cell field for years to come. In recognition of this, the major San Diego research institutes, UCSD, Salk, Burnham and Scripps have banded together in an exciting collaborative called the San Diego Consortium for Regenerative Medicine. Rather than compete independently for CIRM funding, these powerhouses have joined forces in an exciting collaboration which will pursue funding as a group. It is logical to assume some of the discoveries coming from the Consortium will find their way into San Diego commercial labs, and very well may spawn the next generation of start up companies.

Further, the investment community continues to be supportive of the industry. Life sciences continue to lead the categories funded nationwide by venture capitalists. Depending on the metric used, Southern California is second or third nationally in venture funding on the life sciences. The Legislature should take heed of this support of our industry leadership and nurture it, insuring that California maintain its rightful place of leadership in the life sciences.

On behalf of BIOCOM, I thank you for the opportunity to speak to you today and for your interest in this very exciting industry.

San Diego Life Science Community Facts

There are approximately **36,600 employees** in the life science community in San Diego County at more than 500 companies, including traditional biotech, medical device, diagnostic and technology companies (Rich's California Business Directories)

There are four major academic institutions (**UCSD, Scripps, Salk, Burnham**) and many smaller ones.

Annual Economic Impact (direct and indirect): **$8.5 billion** (San Diego Association of Governments)

Funding from the National Institutes of Health: **$815 million** in 2005 (NIH, 2007)

Venture Capital: **$901 million** in 2006 (Ernst & Young/Dow Jones Venture One), with VC investment in Southern California exceeding New England for the third consecutive quarter.

Major Accomplishments and Industry Leaders

Cancer- Rituxan, Sutent, Avastin and Leustatin
Rituxan, the leading treatment for Non-Hodgkin's Lymphoma and one of the most successful cancer therapeutics ever, was created here in San Diego by Idec Pharmaceuticals, now **Biogen Idec**. Biogen Idec, the third largest biotechnology company in the world, bases all of its cancer work in San Diego.
Sutent, a recently approved stomach cancer drug, was developed at **Pfizer's** research center in La Jolla, one of Pfizer's four research centers around the world. Pfizer moved its oncology research to San Diego in 2007.
Avastin, a new therapeutic to treat colorectal cancer, is manufactured in Oceanside by **Genentech**, the world's largest biotechnology company, in a massive 400,000 square foot biologics manufacturing facility.
Leustatin used to treat hairy cell leukemia, was discovered by Dr. Dennis Carson, now at UCSD.

Diabetes- Symlin and Byetta
Symlin and **Byetta**, two of the first new therapeutics to treat diabetes in decades, were approved by the FDA in 2005. The new diabetes treatments were both developed in La Jolla by **Amylin Pharmaceuticals**.

HIV/AIDS- Viracept
Viracept, one of the first protease inhibitors to treat AIDS, was developed in La Jolla by Agouron Pharmaceuticals. This facility is now Pfizer La Jolla.

Diagnostics
More than 80 percent of the nation's blood supply is screened for sexually transmitted diseases with tests made by **Gen-Probe** in Sorrento Mesa.
Most hospital patients with chest pain are given a rapid test made by **Biosite** to identify congestive heart failure.

Medical Devices
DJO, which makes non-surgical orthopedic devices, had sales of $413 million in 2006.
ResMed, which makes sleep apnea devices, had annual sales of $607 million in 2006.

Research tools
Invitrogen makes more than 25,000 lab supply products and had sales of $1.3 billion in 2006. Almost every lab in the world has one of their phone book-sized product catalogs.

Revised 5/4/07

COVER STORY

BIOTECH BOOT CAMP

SUMMER INSTITUTE EXPOSES STUDENTS AND TEACHERS TO CAREER OPTIONS IN THE LIFE SCIENCE INDUSTRY

by Larry M. Edwards

When Aditi Sharma first heard about the Life Sciences Summer Institute, she thought it would be a good way to get her resume out to biotechnology companies. What the bio-medical engineering student didn't know is that the program would lead to an internship under a Nobel Prize winner and a job at Pfizer Inc.

Created in 2005 by the San Diego Workforce Partnership in collaboration with BIOCOM, LSSI tackles the challenge of developing a world-class scientific workforce in San Diego, where the life sciences are the largest technology cluster. The program introduces upper-level high school, community college and university students, as well as high school teachers, to the leading companies in San Diego's life sciences community.

Sharma, now in her third-year at the University of California, San Diego, is an example of how successful the program has been, said Ashley Wildrick, special initiatives program manger at the Workforce Partnership, in the *San Diego Business Journal*.

"The program is constantly changing and becoming a model," she said. "It's not only for biotech, but it's a nice model for high-tech and the telecommunications industry, providing students with basic, hands-on learning. I get e-mails and phone calls from other areas of the country to implement similar programs, but they're not sure how to do it or where to begin."

Twenty percent of the students continued to work either part-time or full-time for the company at which they interned. Sharma is one of those students. After completing a one-week "boot camp," she began a summer internship in Pfizer's Cancer Biology department. That led to a job as a student lab assistant with Pfizer in the Cancer Biology/Oncology department, where she works full-time during the summer months and part-time during the school year until she graduates. She also was awarded a one-week internship performing stem cell research under Nobel Prize winner Dr. Stuart Lipton at the Burnham Institute for Medical Research.

"The Pfizer internship allowed me to gain hands-on experience that cannot be taught in the classroom or learned from a book," Sharma said. "The experience with Dr. Lipton is invaluable, as it allows me to find my niche in the bioengineering world as well as enables me to develop better techniques as a scientist."

She is grateful for the opportunity the LSSI program gave her, allowing her "to discover what the scientific world has to offer to a young scientist of the next generation," and she's realized that "biotech is the path of the future and definitely the path for me."

To date, 118 have students interned at more than a dozen San Diego-area companies and research institutes, and 54 teachers were enrolled in the

Above: Aditi Sharma and mentor Maria Elena Arango in an oncology lab at Pfizer La Jolla.

Photos by Tim Ingersoll

externship program hosted by local life science companies.

Equally important, through the teacher externship program, thousands of students learn about employment opportunities in the life sciences industry. It's estimated that each teacher reaches an average of 189 students per year, and each year the number of participating teachers has more than doubled — increasing from 10 teachers in 2005 to 24 in 2007.

"The teachers who have participated in the program potentially will expose some 16,000 students to a new biotechnology curriculum and career information by the end of the 2007-2008 school year," Wildrick said. "And every year we offer this program, that number will grow exponentially."

STUDENT INTERNS

As interns, students gain exposure to career options, hands-on laboratory experience, work-readiness skills and mentoring by research scientists. The program begins with an introduction to the biotechnology lab through the Biotech Boot Camp. The intensive preparatory course is held at the Southern California Biotechnology Center at Miramar College and is supplemented with materials and supplies from Invitrogen Corp.

"The program opens the students' eyes to myriad possibilities of employment in the life sciences industry for those with a science background — opportunities most of them did not know existed," said Sandy Slivka, director of the biotech center. "The boot camp prepares them for working in a lab, and they learn the skills needed to work within a corporate culture."

Following the week-long training, students begin paid internships within the life sciences industry. Companies who participate in the program gain exposure to prospective future hires and benefit further by providing mentor and managerial experiences for their employees. If companies have already identified interns, those interns can also attend the boot camp. The number of interns increased nearly five-fold in three years, growing from 13 interns in 2005 to 61 interns in 2007.

"This is a successful component of the LSSI program," Slivka said. "In their internships, high school students are doing college-level work."

TEACHER EXTERNS

The teacher externship component of LSSI helped to increase awareness of the local life sciences industries — biotechnology, medical devices, diagnostics and related areas — to individuals who are influential in the development of a future workforce. Science teachers from San Diego County high schools and community colleges gain exposure to the industry through hands-on laboratory curriculum training, company externship experiences and curriculum integration, as well as networking among their peers.

Hosted in Biogen Idec's Community Lab, the two-week paid program includes one week of industry introduction and laboratory curriculum training using the Amgen-Bruce

LSSI PARTICIPATING COMPANIES

30 companies and research institutions have participated in the Life Sciences Summer Institute program from 2005 to 2007.

- Accumetrics
- Alexion Antibody Technologies
- Amgen Foundation
- Anadys Pharmaceuticals
- Arena Pharmaceuticals
- Assure Controls Inc.
- Biogen Idec
- BioServ Corp.
- Burnham Institute for Medical Research
- Conatus Pharmaceuticals
- Conservation and Research for Endangered Species (CRES)
- The Dow Chemical Co.
- eStudySite
- Genentech
- Genomatica
- Genoptix
- Gen-Probe
- Invitrogen Corp.
- Isis Pharmaceuticals
- Karl Strauss Brewing Co.
- Mo BIO Laboratories
- Nanogen
- Pfizer
- Salk Institute for Biological Studies
- San Diego State University Labs
- Senomyx
- SGX Pharmaceuticals
- SCBC Miramar
- Sunrise Science Products
- The Scripps Research Institute

Wallace Biotechnology Laboratory Program curriculum. The second week consists of half-day industry externship experiences and half-day curriculum connection and implementation workshops.

The summer institute also led to a broader science curriculum at local high schools. Malinda Dixon, a science teacher at Westview High School in Poway Unified School District, participated in the program its inaugural year and subsequently developed a full-year biotechnology class, which has been adopted throughout the Poway district. Through the program, students learn skills that prepare them for college-level coursework or that they can take directly into jobs within the life science industry.

"Our goal is to increase student interest in a life sciences career, and some students are hired right out of high school," Dixon said.

Through the program at Biogen Idec's Community Lab, Dixon learned a variety of lab techniques, including the development of recombinant DNA, transformation and protein purification. She now teaches these skills to her students, who conduct experiments with mutant fluorescent proteins from sea anemones.

"They learn to use the same lab techniques the scientists use, such as the use of a micropipette and developing recombinant DNA," Dixon said. "These are the same procedures used by professionals to produce insulin or growth hormones."

LSSI graduate Kurt Patterson works at SGX Pharmaceuticals.

For the past two years, Dixon has also served as one of two teacher leaders for LSSI, facilitating the teacher learning process and serving as liaison to the organizations involved. "This is, by far, the best professional growth program I have ever attended," Dixon said. "It is very meaningful, offering something teachers can take back to the classroom and use with their students."

FUNDING NEEDED

The LSSI project, which costs about $225,000 a year, has been funded by a grant awarded under the President's High Growth Job Training Initiative and implemented by the U.S. Department of Labor's Employment and Training Administration. However, the grant has expired, and the LSSI partners are seeking alternate funding sources to continue the program. They are soliciting greater institutional support through corporate foundations and the local industry, building partnerships to leverage internal resources and reduce the costs.

"This is a great program that needs continued support from the industry," said Joe Panetta, president and CEO of BIOCOM. "The LSSI program has exposed students and teachers to modern life science curriculum and if sustained, it will increase the pipeline of workers into the biotechnology industry in the future."

Larry Edwards is a senior writer with Cook & Schmid. For more information, go to www.cookandschmid.com.